Claims

1. A radio frequency receiver for use in a proximity detecting system, the radio frequency receiver comprising

at least one antenna coil operable to receive radio frequency signals;

tunable receiver circuitry arranged in operative association with the antenna coil and being arranged to modify the frequency at which radio signals are received by the radio frequency receiver;

a signal processor arranged to amplify and filter signals received by the radio frequency receiver; and

a processing system arranged to receive radio signals amplified and filtered by the signal processor so as to evaluate a signal strength associated with each said antenna coil, the processing system being arranged to evaluate a distance between a radio frequency transmitter and the radio frequency receiver on the basis of evaluated signal strengths associated with radio signals received by the at least one antenna coil;

wherein the radio frequency receiver is operable to receive and process radio signals of frequencies between 100kHz and 10MHz.

2. A radio frequency receiver according to claim 1, including three antenna coils, wherein the tunable receiver circuitry is selectively arranged to cooperate with each said antenna coil.

3. A radio frequency receiver according to claim 2, wherein each antenna coil is positioned along an axis in a direction extending substantially perpendicular to that occupied by the other antenna coils.

4. A radio frequency receiver according to claim 2 or claim 3, wherein, in a first operating condition, the receiver circuitry is arranged to select each of the three antenna coils in accordance with a specified selection procedure.

5. A radio frequency receiver according to claim 4, wherein the selection procedure comprises selecting each of the antenna coils sequentially.

6. A radio frequency receiver according to any one of claim 2 to claim 4, wherein the processing system is arranged to evaluate a distance between a radio frequency transmitter and the radio frequency receiver on the basis of evaluated signal strengths associated with radio signals received by each antenna coil.

7. A radio frequency receiver according to any one of claim 4 to claim 6, wherein the receiver circuitry is arranged to operate in a second operating condition wherein none of the antenna coils is selected and the signal processor is arranged to amplify and filter radio signals in the second operating condition.

8. A radio frequency receiver according to claim 7 dependent on claim 4 or claim 5, wherein the processing system is arranged to use the filtered and amplified signals corresponding to the second operating condition to modify the signal strengths evaluated in the first operating condition.

9. A radio frequency receiver according to claim 8, wherein the signal processor is arranged to identify, within a time period, a sequence of frequencies in the amplified and filtered radio signals.

10. A radio frequency receiver according to claim 9, wherein the signal processor is adapted to identify correlation between filtered radio signals in order to identify a sequence of frequencies in the received signals.

11. A radio frequency receiver according to any one of claim 8 to claim 10, wherein the signal processor is arranged to identify a modulation pattern within the received radio signals and to compare the identified modulation pattern with a specified modulation pattern.

12. Proximity detecting apparatus comprising a low radio frequency receiver according to any one of claim 1 to claim 11 and a low radio frequency transmitter arranged to transmit radio signals of frequencies less than 10 MHz, wherein the radio frequency receiver is arranged to receive and process signals from said radio frequency transmitter so as to generate data indicative of a distance between said radio frequency transmitter and radio frequency receiver.

13. Proximity detecting apparatus according to claim 12, including a further said radio frequency transmitter, wherein said receiver antenna coils are arranged to receive first signals from the radio frequency transmitter and second signals from said further radio frequency transmitter.

14. Proximity detecting apparatus according to claim 13, wherein the processing system is arranged to access a function operable to output data indicative of a position in response to input indicative of signal strength received by the antenna coils, the processing system being arranged to input first and second signals to said function and to combine output indicative of first and second positions corresponding thereto so as to identify a position of the radio frequency receiver.

15. Proximity detecting apparatus comprising first and second low radio frequency receivers according to any one of claim 1 to claim 12, and a low radio frequency transmitter arranged to transmit radio signals of frequencies less than 10 MHz, wherein each of said first and second radio frequency receivers is arranged to receive and process signals transmitted from said radio frequency transmitter and wherein the proximity detecting apparatus comprises means arranged to combine signals processed by said first and second radio frequency receivers so as to generate data indicative of a position of said radio frequency transmitter relative to said first and second radio frequency receivers.

16. A low frequency radio receiver for use in a proximity detecting

system, the radio frequency receiver comprising three antenna coils each being operable to receive radio frequency signals at frequencies less than 10 MHz; tunable receiver circuitry arranged in operative association with each coil and being arranged to modify the frequency at which signals are received by the radio frequency receiver; signal processing means arranged to amplify and filter signals received by the radio frequency receiver; and frequency sequence identifying means arranged to identify, within a time period, a sequence of frequencies in the amplified and filtered signals.

17. A low frequency radio receiver according to claim 16, wherein, in a first operating condition, the receiver circuitry is arranged to select each of the three antenna coils in accordance with a specified selection procedure.

18. A low frequency radio receiver according to claim 17, wherein the selection procedure comprises selecting each of the antenna coils sequentially.

19. A low frequency radio receiver according to any one of claim 16 to claim 18, wherein the frequency sequence identifying means is arranged to correlate the filtered signals associated with at least one antenna coil in order to identify said sequence of frequencies.

20. A low frequency radio receiver according to any one of claim 17 to claim 19, wherein, for each frequency in the sequence, the receiver circuitry is arranged to operate in a second operating condition wherein none of the antenna coils is selected and the signal processor is arranged to amplify and filter signals corresponding to the second operating condition.

21. A low frequency radio receiver according to claim 20, wherein the processing system is arranged to use the filtered and amplified signals corresponding to the second operating condition to modify the signal strengths corresponding to the first operating condition.

22. A low frequency radio receiver according to any one of claim 16 to claim 21, including a processing system arranged to process filtered signals corresponding to the three antenna coils in accordance with a predetermined location determining algorithm so as to identify the position of a source of said radio signals received by the radio frequency receiver.

23. A low frequency radio receiver according to any one of the preceding claims, wherein the processing system is integral with the radio frequency receiver.

24. A frequency radio transmitter for use in proximity detection apparatus, the radio frequency transmitter being operable to selectively transmit signals at a plurality of different frequencies, and comprising an antenna circuit having a variable impedance and a frequency bandwidth associated therewith, the frequency bandwidth defining a frequency band within which the radio frequency transmitter is operable to transmit signals, wherein the antenna circuit is operable to modify the impedance so as to modify the magnitude of said frequency bandwidth, and to transmit a radio frequency signal having a frequency within said modified frequency bandwidth.

25. A frequency radio transmitter according to claim 24, wherein the antenna circuit includes a coil comprising a plurality of windings and tapping means for connection to said windings so as to vary the magnitude of the frequency bandwidth of the antenna circuit.

26. A frequency radio transmitter according to claim 25, wherein the tapping means is arranged to connect to a set of the plurality of windings.

27. A frequency radio transmitter according to claim 26, wherein the antenna circuit comprises:

a transformer comprising a first coil having a first plurality of windings

and a second coil having a second plurality of windings; and

tapping means for connection to said second plurality of windings so as to vary the frequency bandwidth of the antenna circuit.

28. A radio frequency transmitter according to claim 27, wherein the tapping means is arranged to connect to a set of the second plurality of windings.

29. A radio frequency transmitter according to any one of claim 24 to claim 28, including a direct current power supply, wherein said set of said windings is connectable to the power supply via a return path.

30. A radio frequency transmitter according to claim 29, wherein the return path includes a current direction controlling device.

31. A radio frequency transmitter according to claim 29 or claim 30, wherein the power supply comprises a battery and switching means arranged, in response to receipt of current from the battery, to output an alternating current.

32. A radio frequency transmitter according to claim 31, including variable frequency generation means arranged in operative association with said switching means, wherein the frequency of the alternating current output from said switching means is variable in accordance with input received from the variable frequency generation means.

33. A radio frequency transmitter according to any one of claim 29 to claim 32, including a capacitor arranged in parallel with said power supply, wherein the return path is connectable to said capacitor so as to return current from said set of windings to the capacitor.

34. A radio frequency transmitter comprising an antenna circuit, wherein the antenna circuit comprises a capacitance (C), and a coil comprising a

plurality of windings having an inductance (L), the antenna circuit having a frequency bandwidth (δf) associated therewith and including tapping means for connection to the coil so as to create a first set of windings and a second set of windings, each set of windings having a number of turns, wherein the number of turns of the first set is related to the number of turns of the second set by a turns ratio (n), and the frequency bandwidth of the antenna circuit is at least $\delta f = \frac{1}{4\pi.n.\sqrt{LC}}$.

35. A radio frequency transmitter according to any one of claim 24 to claim 34, operable to selectively transmit signals at a plurality of different frequencies less than 10 MHz.